

**WHAT IS CLAIMED IS:**

1           1. A method of preparing nickel oxyhydroxide comprising:  
2           combining a nickel hydroxide and a hydroxide salt in an inert atmosphere to form a  
3           mixture; and  
4           exposing the mixture to ozone to form a nickel oxyhydroxide.

1           2. The method of claim 1, wherein the nickel hydroxide includes a beta-nickel  
2           hydroxide, a cobalt hydroxide-coated beta-nickel hydroxide, an alpha-nickel hydroxide, or a  
3           cobalt hydroxide-coated alpha-nickel hydroxide.

1           3. The method of claim 1, wherein the nickel oxyhydroxide includes a beta-nickel  
2           oxyhydroxide, a cobalt oxyhydroxide-coated beta-nickel oxyhydroxide, a gamma-nickel  
3           oxyhydroxide, or a cobalt oxyhydroxide-coated gamma-nickel oxyhydroxide.

1           4. The method of claim 1, wherein the inert atmosphere is substantially free of  
2           carbon dioxide.

1           5. The method of claim 1, wherein the inert atmosphere is substantially free of water.

1           6. The method of claim 1, wherein the inert atmosphere is substantially free of  
2           carbon dioxide and substantially free of water.

1           7. The method of claim 1, further comprising heating the mixture prior to or during  
2           exposing the mixture to ozone.

1           8. The method of claim 1, further comprising agitating the mixture during exposing  
2           the mixture to ozone.

1 9. The method of claim 1, wherein exposing the mixture to ozone includes contacting  
2 the mixture with a gas mixture including ozone.

1 10. The method of claim 9, wherein the gas mixture includes dioxygen.

1 11. The method of claim 9, wherein the gas mixture includes water.

1 12. The method of claim 1, wherein the nickel hydroxide is a powder including  
2 particles having a spherical, spheroidal, or ellipsoidal shape.

1 13. The method of claim 1, wherein the nickel hydroxide is a substantially dry nickel  
2 hydroxide.

1 14. The method of claim 1, wherein the hydroxide salt includes potassium hydroxide,  
2 sodium hydroxide, lithium hydroxide, or mixtures thereof.

1 15. The method of claim 1, wherein the hydroxide salt includes silver hydroxide or  
2 gold hydroxide.

1 16. The method of claim 1, wherein the mixture is exposed to ozone for less than 24  
2 hours.

1 17. The method of claim 16, wherein the nickel hydroxide includes a cobalt  
2 hydroxide-coated beta-nickel hydroxide or a cobalt hydroxide-coated alpha-nickel hydroxide.

1 18. The method of claim 1, wherein the mixture further includes an oxidation-  
2 promoting additive.

1 19. The method of claim 18, wherein the oxidation-promoting additive includes  
2 metallic silver, silver(+1) oxide, silver(+1,+3) oxide, metallic gold, gold (+3) oxide, gold  
3 (+3) hydroxide, potassium peroxide, potassium superoxide, potassium permanganate, or  
4 silver permanganate.

1 20. The method of claim 1, wherein the nickel hydroxide includes a bulk dopant.

1 21. The method of claim 1, wherein the bulk dopant includes aluminum, manganese,  
2 cobalt, gallium, indium, or bismuth.

1 22. A battery comprising:  
2 a cathode comprising a carbonate-free nickel oxyhydroxide;  
3 an anode;  
4 a separator; and  
5 an electrolyte.

1 23. The battery of claim 22, wherein the nickel oxyhydroxide includes a cobalt  
2 oxyhydroxide-modified nickel oxyhydroxide.

1 24. The battery of claim 22, wherein the nickel oxyhydroxide includes a cobalt  
2 oxyhydroxide-modified gamma-nickel oxyhydroxide.

1 25. The battery of claim 22, wherein the anode comprises zinc.

1 26. The battery of claim 23, wherein the cathode further includes an oxidizing  
2 additive.

1 27. The battery of claim 26, wherein the oxidizing additive includes sodium  
2 hypochlorite, sodium peroxydisulfate, potassium peroxydisulfate, potassium permanganate,  
3 barium permanganate, barium ferrate, silver permanganate, disilver oxide, or silver oxide.

1           28. The battery of claim 22, wherein the electrolyte includes potassium hydroxide,  
2           sodium hydroxide, lithium hydroxide, or mixtures thereof.

1           29. A method of manufacturing a battery comprising:  
2           combining a nickel hydroxide and a hydroxide salt in an inert atmosphere to form a  
3           mixture;  
4           exposing the mixture to ozone to form a nickel oxyhydroxide; and  
5           assembling a cathode comprising the nickel oxyhydroxide, an anode, a separator, and  
6           an electrolyte to form the battery.

1           30. A method of decreasing capacity loss in a nickel oxyhydroxide battery  
2           comprising:  
3           combining a nickel hydroxide and a hydroxide salt in an inert atmosphere to form a  
4           mixture;  
5           exposing the mixture to ozone to form a nickel oxyhydroxide;  
6           forming a cathode including the nickel oxyhydroxide; and  
7           assembling the cathode, an anode, a separator, and an electrolyte to form the alkaline  
8           battery,  
9           wherein the battery has a capacity loss after storage for 4 weeks at 60°C of less than  
10          30 percent.

          31. The method of claim 30, wherein the nickel hydroxide is cobalt hydroxide  
          modified nickel hydroxide.